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1 Attorney Docket No. 79943

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3 CRUISE MISSILE DOWNED AIRMAN DECOY

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5 STATEMENT OF GOVERNMENT INTEREST

6 The invention described herein may be manufactured and used
7 by or for the Government of the United States of America for
8 governmental purposes without the payment of any royalties
9 thereon or therefor.

10
11 BACKGROUND OF THE INVENTION

12 (1) Field of the Invention

13 The present invention relates generally to decoys emitting
14 radio signals to increase the survivability of a downed airman.
15 More particularly, this invention relates a cruise missile
16 deploying a preprogrammed pattern of decoys each having a radio
17 transmitter to confuse enemy searchers.

18 (2) Description of the Prior Art

19 One of the hazards of air operations in airspace over enemy
20 territory is the possibility of losing aircraft. Once an airman
21 is forced to abandon the aircraft, the parachute, training, and
22 survival equipment must be relied upon to evade capture and to
23 contact friendly search and rescue teams for rescue. One
24 essential element to make possible an eventual rescue is the

1 portable radio carried by downed airmen (e. g. an AN/PRC-90)
2 that permits voice communications or a radio-signal beacon for
3 friendly searchers to home in on. Usually signals are
4 transmitted at specific times using codes set at the pre-mission
5 briefing. A combination of voice and beacon transmissions
6 guides rescuers to an appropriate pick-up point. However, like
7 all radio frequency transmissions, these signals are susceptible
8 to interception by enemy forces and location of the source by
9 their directional radio antennas. This puts not only the airman
10 in peril, but also the aircraft and personnel of the search-and-
11 rescue teams.

12 Thus, in accordance with this inventive concept, a need has
13 been recognized in the state of the art for a system to quickly
14 deploy patterns of decoys that emit radio signals to confuse and
15 mislead hostile searchers for a downed airman.

16

17 SUMMARY OF THE INVENTION

18 The first object of the invention is to provide a plurality
19 of decoys each emitting radio signals to improve the chances of
20 survivability and evasion by downed airmen.

21 Another object of the invention is to provide a cruise
22 missile deploying decoys in a pattern to each emit radio signals
23 that confuse and mislead unfriendly searchers for downed airmen.

1 Another object of the invention is to provide a cruise
2 missile deploying radio-signal emitting decoys at standoff
3 distances to avoid placing additional personnel and assets in
4 jeopardy.

5 Another object of the invention is to provide a capability
6 for a single launch platform to simultaneously deploy decoys
7 emitting radio signals from cruise missiles in multiple fields,
8 hundreds of miles apart.

9 Another object of the invention is to provide the
10 capability of deploying cruise missiles that distribute decoys
11 emitting radio signals in multiple, separated fields to deceive
12 and draw enemy troops and equipment in preparation of, or in
13 conjunction with, an air strike.

14 These and other objects of the invention will become more
15 readily apparent from the ensuing specification when taken in
16 conjunction with the appended claims.

17 Accordingly, the present invention deploys decoys from one
18 or more cruise missiles enabling transmission by radio
19 transmitters on each decoy to thereby confusing and misleading
20 enemy forces.

21

22 BRIEF DESCRIPTION OF THE DRAWINGS

23 A more complete understanding of the invention and many of
24 the attendant advantages thereto will be readily appreciated as

1 the same becomes better understood by reference to the following
2 detailed description when considered in conjunction with the
3 accompanying drawing wherein like reference numerals refer to
4 like parts and wherein:

5 FIG. 1 is a schematic showing of a cruise missile deploying
6 a decoy for emitting radio signals in accordance with this
7 invention;

8 FIG. 2 is a cross-sectional view showing details of a decoy
9 of this invention; and

10 FIG. 3 depicts a radio beacon decoy separating from its
11 parachute as it comes to rest on the ground.

12

13 DESCRIPTION OF THE PREFERRED EMBODIMENTS

14 Referring to FIG. 1, a cruise missile 7 is shown as it
15 flies a predetermined course and ejects a decoy 10 of this
16 invention. Cruise missile 7 can be a submarine-launched
17 Tomahawk cruise missile or some other radar-evading missile. In
18 accordance with this invention, the Tomahawk cruise missile (UGM
19 109D), originally designed to deliver four payload modules of
20 six small sub-munitions each to multiple targets, is adapted to
21 carry a separate decoy 10 in a protective decoy shell 11 in each
22 stowage space 12 and eject decoy 10 from its stowage space 12 in
23 accordance with a predetermined launch sequence. This
24 adaptation allows a single submarine or other launch platform to

1 launch many decoys 10 from one or more cruise missiles in a wide
2 field to transmit many false messages or radio beacons to
3 deceive and confuse defensive forces.

4 Referring to FIG.2 in conjunction with FIG.1, decoy shell
5 11 of each decoy 10 has virtually the same dimensions as the
6 sub-munitions pack it replaces in stowage space 12 and is made
7 from strong metal or plastic materials to provide impact and
8 environmental protection for components of decoy 10.
9 Decoy shell 11 is internally divided into three compartments, a
10 parachute compartment 13 containing a folded parachute 14, an
11 antenna compartment 19 housing an antenna 20, and a components
12 compartment 23 containing a radio transmitter 24, control unit
13 25 and associated components.

14 Parachute compartment 13 in decoy shell 11 not only stows
15 parachute 14, it additionally is provided with a lanyard 15, an
16 arming switch 16, and a lanyard release 17. Lanyard 15 has a
17 weak point, or weak point section 15a that is made to break and
18 separate first and second sections 15' and 15". This separation,
19 in turn, separates decoy 10 from missile 7 when decoy 10 is
20 subjected to slipstream loading during the sequence of launch
21 from missile 7. Lanyard 15 is secured to parachute 14 via
22 lanyard portion 15b, to a pin 16a on arming switch 16 via
23 lanyard portion 15c, and to a lanyard release 17 via lanyard
24 portion 15d in the interior of parachute compartment 13.

1 Lanyard portions 15b, 15c, and 15d together make up first
2 section 15' of lanyard 15. Lanyard 15 is looped under parachute
3 14 and lanyard portion 15e, (second section 15" of lanyard 15)
4 extends from parachute compartment 13 through a small slot 18a
5 in a cover portion 18 of protective shell 11, and is secured to
6 a closure door 31 of missile 7. Cover 18 is made of an easily
7 frangible material, such as fabric or plastic that extends
8 across folded parachute 14 to hold it in parachute compartment
9 13 prior to deployment of decoy 10 from cruise missile 7. A
10 lanyard release 17 containing an ignitable or explosive squib is
11 connected to lanyard portion 15d and to an inner wall of
12 parachute compartment 13. Ignition of lanyard release 17 by a
13 separation-control signal from control unit 25 separates lanyard
14 15 to free decoy 10 from parachute 14.

15 Protective shell 11 has an antenna compartment 19 that
16 contains an elongate antenna 20 coupled to an antenna spring 20a
17 that exerts a biasing force to urge antenna 20 to a position
18 extending away from the rest of the components of decoy 10.
19 Protective shell 11 is provided with an antenna compartment
20 cover 21 that seals antenna compartment 19, protects antenna 20
21 and antenna spring 20a from the ambient, and holds antenna 20
22 inside of antenna compartment 19 prior to deployment. A cover
23 latch 21a possibly containing an ignitable or explosive squib
24 holds antenna compartment cover 21 in a closed position on

1 antenna compartment 19 until an appropriate open-control signal
2 on lead 25b from control unit 25 is coupled to it. Ignition of
3 cover latch 21a by the open-control signal frees spring-loaded
4 hinge 22 that has been held in compression to pivotally rotate
5 antenna compartment cover 21 and open it so that antenna 20 may
6 be extended outwardly from decoy 10 by the force of spring 20a.

7 Components compartment 23 of decoy 10 contains radio
8 transmitter 24, control unit 25, battery 26, explosives 27 and
9 motion sensor 28 plus their interconnections. Radio transmitter
10 24 is coupled by a lead 24a to antenna 20 to transmit radio
11 signals. These radio signals can be preset in frequency and
12 information content to act as false beacon signals or false
13 message signals. The constituency of both these signals can be
14 preprogrammed in transmitter 24 and transmitted in response to
15 radio-control signals from control unit 25 that are communicated
16 to transmitter 24 over lead 25c.

17 Control unit 25 is coupled to battery 26 via lead 26a, for
18 transmitter 24 over lead 26b and for all other control functions
19 for decoy 10. Control unit 25 provides the appropriate control
20 signals mentioned hereinabove to effect internal control
21 functions in decoy 10. Control unit 25 is connected via lead
22 28a to motion sensor 28 to receive motion signals representative
23 of motion and/or changed orientation of decoy 10, for the
24 purpose to be explained below. In addition, control unit 25 can

1 couple a detonation-control signal over lead 25d to explosives
2 27 to detonate explosives 27 and destroy decoy 10 after a preset
3 period or on receipt of outside stimulus, such as from motion
4 sensor 28.

5 In operation, at least one cruise missile 7 located on
6 board a launch platform is outfitted with decoys 10 and
7 maintained in a state of readiness for launch of the decoys
8 until notification arrives that an airman is downed in enemy
9 territory. The attack party on the launch platform plots
10 waypoints for a flight path over the designated area the airman
11 is downed in and launches cruise missile 7. Many different
12 patterns of flight over the designated area may be plotted to
13 assure that missile 7 ejects decoys 10 at timed intervals
14 between waypoints to effectively deceive enemy searchers.

15 In FIG. 1, cruise missile 7 is shown just after ejection of
16 the last decoy 10 of one payload module 29. (There may be up to
17 four payload modules on each Tomahawk cruise missile, and since
18 each module holds 6 decoys, a total of 24 decoys can be deployed
19 per missile.) The other decoys of payload module 29 have been
20 deployed and closure doors 31 are shown rotated about an
21 elongate hinge 32 and latched closed by latches 33 to provide
22 fairings for the airframe of missile 7 for the rest of the
23 flight. During and after ejection of decoy 10, payload module
24 29 works substantially the same it would using the existing

1 Tomahawk UGM-109D with the exception that only one decoy 10 is
2 ejected at a time as compared to the procedure of ejecting six
3 sub-munitions at a time during conventional deployments of the
4 sub-munitions.

5 Upon ejection of each decoy 10, lanyard portion 15d of
6 lanyard 15 remains tethered to closure door 31 of its payload
7 module 29. While lanyard 15 is being pulled taut, lanyard
8 portion 15d pulls closure door 31 shut while simultaneously
9 pulling parachute 14 through tear-through cover 18. As lanyard
10 15 continues to be pulled taut, lanyard portion 15c pulls pin
11 16a on arming switch 16 to activate control unit 25. After
12 closure door 31 is pulled shut and latched by lanyard 15 and
13 parachute 14 is clear of missile 7, the load created by the
14 slipstream of ambient air around missile 7 breaks taut lanyard
15 15 at weak point section 15a to separate decoy 10 from missile
16 7. Decoy 10 falls freely to earth and completes deployment of
17 parachute 14. The closed and latched closure doors 31 maintain
18 a streamlined outer surface for missile 7 as it continues on its
19 mission.

20 Referring to FIG. 3 in conjunction with FIGS. 1 and 2,
21 parachute 14 has filled and slowed the descent of decoy 10, and
22 decoy 10 has just touched down on ground 50. On receipt of a
23 signal from motion detector 28 or after a first delay, control
24 unit 25 provides a separation-control signal over lead 25a to

1 initiate lanyard release 17 to separate parachute 14 from the
2 rest of decoy 10. After a second delay, control unit 25
3 provides an open-control signal on lead 25b to fire cover latch
4 21a so that spring-loaded hinge 22 pivotally rotates and snaps
5 open cover 21 of antenna compartment 29 to allow antenna spring
6 20a to laterally extend antenna 20. The curved surfaces of
7 antenna compartment cover 21 and decoy shell 11 tend to prevent
8 decoy 10 from coming to rest with antenna compartment 19 facing
9 ground 50.

10 If, however, antenna compartment 19 does face ground 50,
11 the relatively powerful spring-loaded hinge 22 is strong enough
12 to pivotally rotate antenna compartment cover 21 and roll decoy
13 10 off antenna compartment 19 to allow antenna compartment cover
14 21 to open. With cover 21 forcefully rotated open by spring-
15 loaded hinge 22, antenna 20 is extended from antenna compartment
16 19 by antenna spring 20a.

17 Now, or after a predetermined delay, control unit 25
18 activates radio transmitter 24 and may enable motion sensor 28.
19 Control unit 25 cycles transmitter 24 intermittently to
20 optionally transmit false message and/or beacon signals over a
21 prolonged period of time. Control unit 25 can be programmed to
22 send a detonation signal over lead 25d to detonate explosive 27
23 and destroy decoy 10. It may be expedient to destroy decoy 10
24 when the mission has been completed, the level of power in

1 battery 26 falls below a specified level, a predetermined period
2 has passed, or motion is sensed by motion sensor 28 that might
3 indicate that decoy 10 is being tampered with.

4 Cruise missile 7 deploys decoys 10 at a safe standoff
5 distance that does not place personnel and other assets in
6 jeopardy in the vicinity of a downed crewmember. During intense
7 air operations, a single submarine can be called upon to launch
8 one or more cruise missiles 7 to simultaneously lay multiple
9 fields of decoys 10. These fields may be hundreds of miles
10 apart to confuse searchers for several downed airmen at
11 different locations. In addition to deceiving unfriendly
12 searchers for downed airmen, decoys 10 may be dispersed in
13 preparation of, or in conjunction with, an air strike or landing
14 to deceive and draw away enemy troops and equipment.

15 The deployment of deceptive decoys 10 using existing cruise
16 missiles 7 is an extension of the field of tactical application
17 of this missile to further assure retention of this missile in
18 inventory. After delivering the decoys, missile 7, outfitted
19 with GPS and using residual fuel as an incendiary could attack a
20 specific target. Providing floats on each decoy 10 could permit
21 use of such decoys over water for the purpose of confusing enemy
22 searchers or tactically deceiving enemy naval forces. Cruise
23 missile 7 and/or decoys 10 could be provided with cameras to

1 gather and relay information on enemy strength and movements via
2 loitering missile 7 and/or deployed decoys 10.

3 The disclosed components and their arrangements as
4 disclosed herein all contribute to the novel features of this
5 invention. Decoy 10 and the deployment thereof by cruise
6 missile 7 provide reliable and cost-effective means to help
7 downed airmen deceive and evade capture by enemy defense forces.
8 Therefore, decoy 10 and its deployment by cruise missile 7 as
9 disclosed herein are not to be construed as limiting, but
10 rather, are intended to be demonstrative of this inventive
11 concept.

12 It will be understood that many additional changes in the
13 details, materials, steps and arrangement of parts, which have
14 been herein described and illustrated in order to explain the
15 nature of the invention, may be made by those skilled in the art
16 within the principle and scope of the invention.

1 Attorney Docket No. 79943

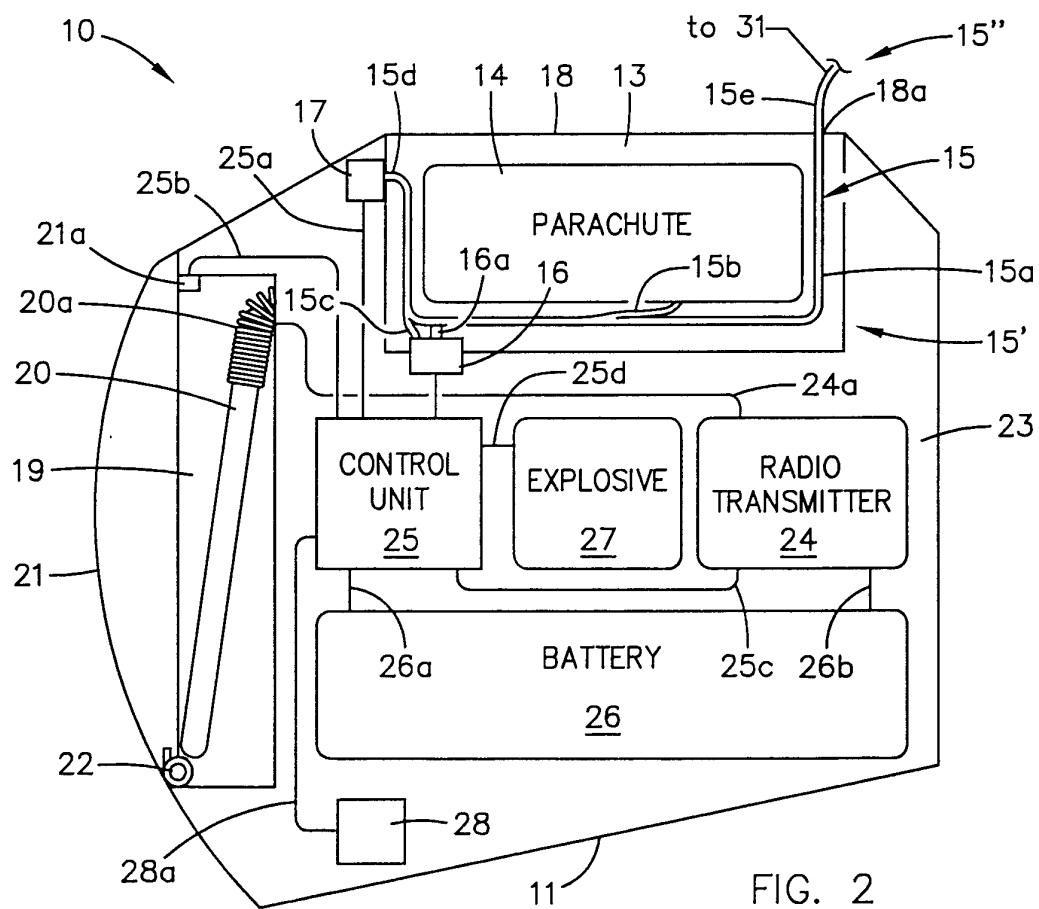
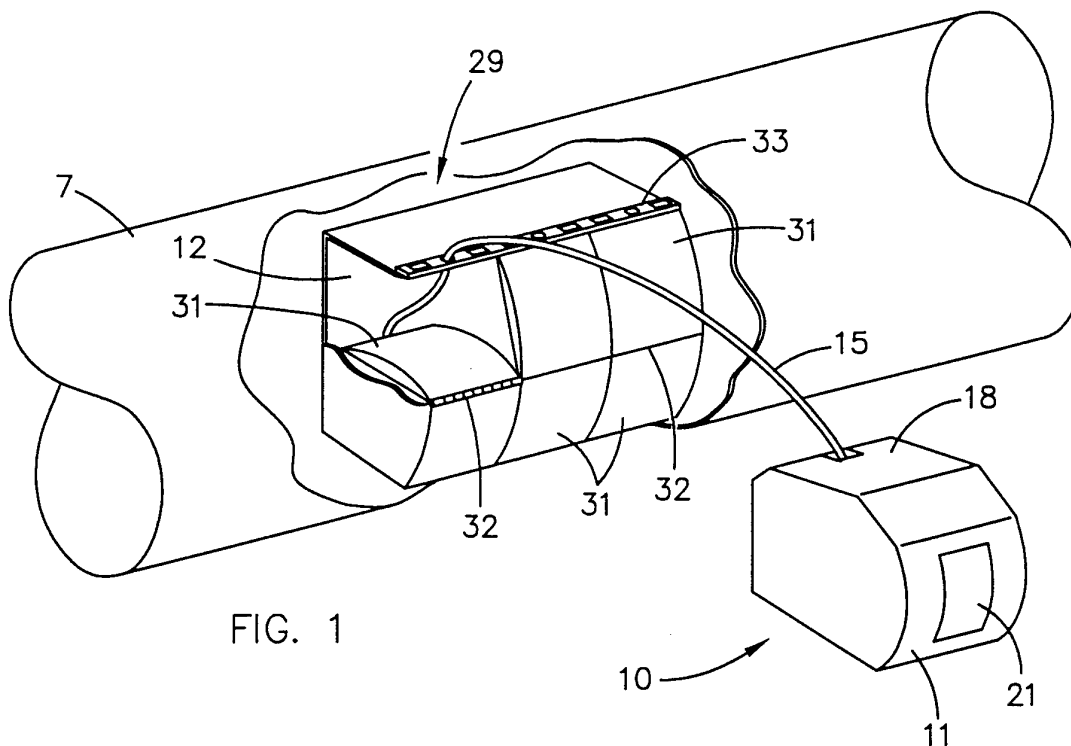
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3 CRUISE MISSILE DOWNED AIRMAN DECOY

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5 ABSTRACT OF THE DISCLOSURE

6 A cruise missile, such as the Tomahawk cruise missile, is
7 adapted to deploy decoys in an area as the missile progresses
8 along its preprogrammed course. Each decoy is shaped to be
9 compatible with and ejected from the Tomahawk and has a
10 preprogrammed control unit operating a transmitter connected to
11 an extendible antenna. False beacon signals and/or false message
12 signals are transmitted from each of the decoys to deceive and
13 confuse defensive forces, such as enemy searchers looking for a
14 downed airman.



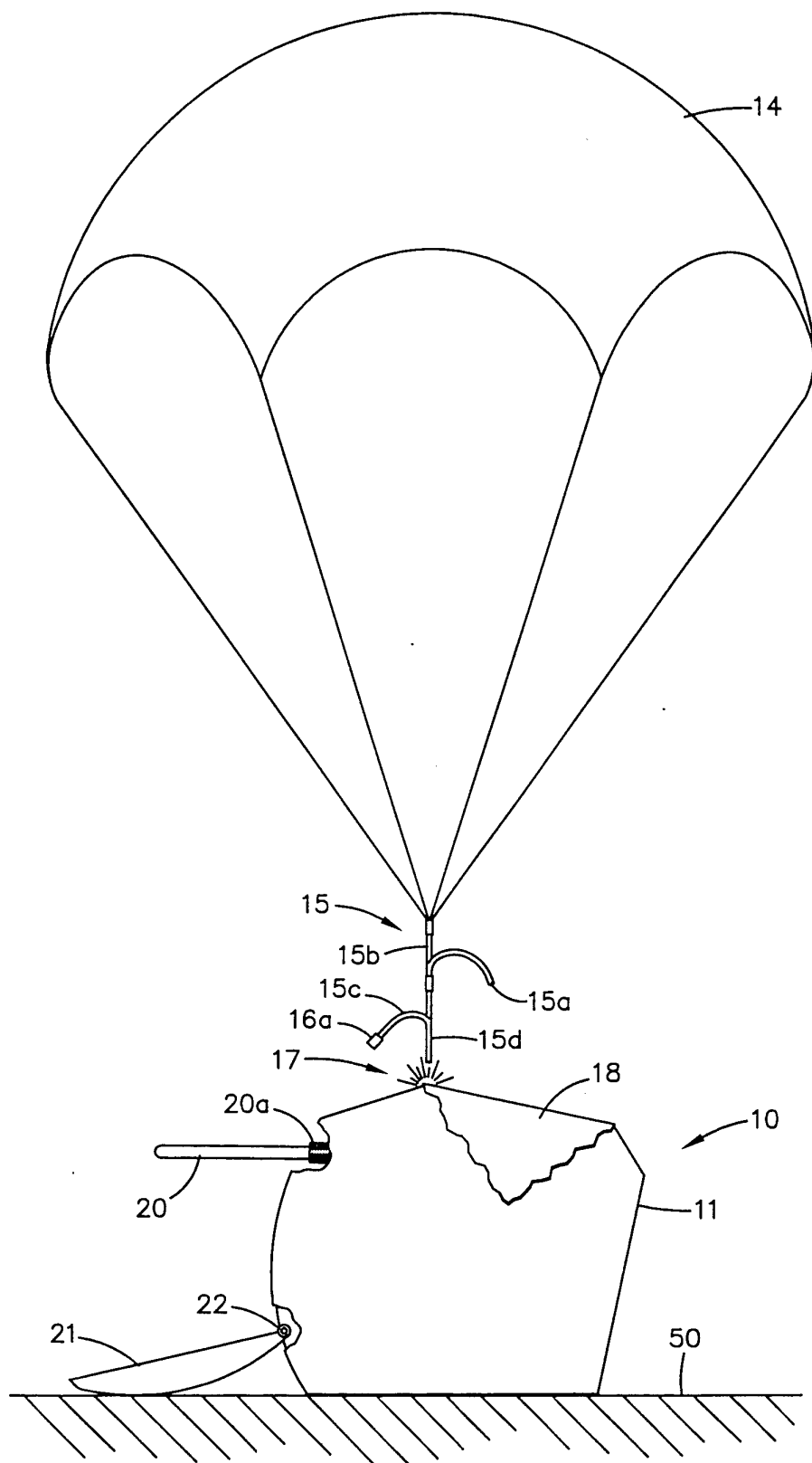


FIG. 3